Moxa ToughNet Switch
TN-5524-8PoE
Hardware Installation Guide

Layer 2 M12 Managed PoE Ethernet Switches

Second Edition, April 2014

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P/N: 1802055240011

Overview

The ToughNet TN-5524-8PoE series M12 managed Ethernet switches are designed for industrial applications in harsh environments. The TN series switches use M12 and other circular connectors to ensure tight, robust connections, and guarantee reliable operation against environmental disturbances, such as vibration and shock. The TN-5524-8PoE series switches provide 24 Fast Ethernet M12 ports, 8 of which are 10/100BaseT(X) PoE compliant.

TN-5524-8PoE switches provide up to 15.4 watts of power per PoE port, and allow power to be supplied to connected devices (such as surveillance cameras, wireless access points, and IP phones) when AC power is not readily available or is cost-prohibitive to provide locally. Models with an extended operating temperature range of -40 to 75°C are also available. The TN-5524-8PoE series Ethernet switches are compliant with EN50155/50121-3-2/50121-4 (railway applications), making the switches suitable for onboard train applications.

Package Checklist

Your ToughNet TN-5524-8PoE switch is shipped with the following items. If any of these items is missing or damaged, contact your customer service representative for assistance.

- 1 Moxa ToughNet switch
- Hardware installation guide
- CD-ROM with user's manual, Windows utility, and SNMP MIB file
- Moxa product warranty statement
- M12 to DB9 console port cable
- 2 protective caps for console and relay output ports
- Panel mounting kit

Features

Anti-Vibration Circular Connectors for Robust Links

- M12 D-coding 4-pin female connectors for Fast Ethernet 10/100BaseT(X) ports
- M12 A-coding 5-pin male connectors for console and relay output
- M23 6-pin male connector for power input

Isolated Power Input

- Supports 24 VDC (16.8 to 30 VDC), isolated

High Performance Network Switching Technology

- IPv6 ready, certified by the IPv6 Logo Committee
- IEEE 1588 PTP (Precision Time Protocol) for the precise time synchronization of networks
- DHCP Option 82 for IP address assignment with different policies
- Modbus/TCP industrial Ethernet protocol
- Turbo Ring, Turbo Chain,and RSTP/STP (IEEE802.1w/D)
- IGMP Snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- Port-based VLAN, IEEE802.1Q VLAN, and GVRP protocol to ease network planning
- QoS (IEEE802.1p/1Q and TOS/DiffServ) to increase determinism
- 802.3ad, LACP for optimum bandwidth utilization

- IEEE802.1X and https/SSL to enhance network security
- SNMP v1/v2c/v3 for different levels of network management
- RMON for efficient network monitoring and proactive capability
- Bandwidth management prevents unpredictable network status
- Lock port restricts access to authorized MAC addresses only
- Port mirroring for online debugging
- Automatic warning by exception through email, relay output
- Automatic recovery of connected devices' IP addresses
- Line-swap fast recovery
- LLDP for automatic topology discovery through network management software
- Configurable through Web browser, Telnet/Serial console, and Windows utility

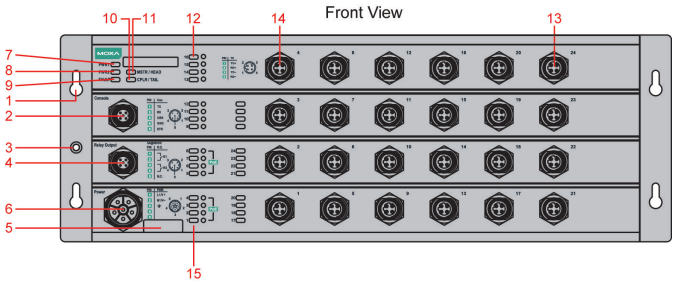
Designed for Industry-specific Applications

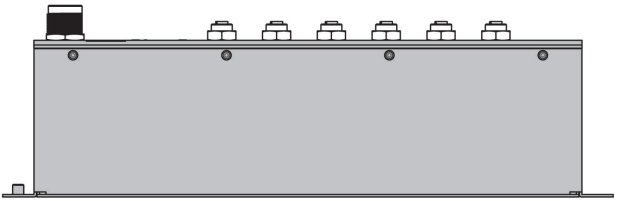
- Power failure, port break alarm by relay output
- EN50155/EN50121-3-2/EN50121-4
- -40 to 75°C operating temperature range (for "-T" models)
- IP40, rugged high-strength housing
- Panel mounting mounting installation capability

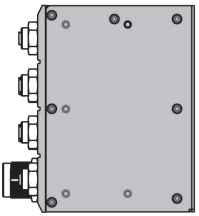
Recommended Optional Accessories

- CBL-M23(FF6P)/OPEN-BK-100 IP67:
  1-meter M23 to 6-pin power cable with IP67-rated female 6-pin M23 connector
- PLG-WPM23-01-IP67:
  M23 cable connector, female 6-pin, crimp type
- CBL-M12D(MM4P)/RJ45-100 IP67:
  1-meter M12-to-RJ45 Cat-5E UTP Ethernet cable with IP67-rated male 4-pin M12 D-coded connector
- CBL-M12(FF5P)/OPEN-100 IP67:
  1-meter M12-to-5-pin power cable with IP67-rated female 5-pin M12 A-coded connector
- M12D-4P-IP68:
  Field-installable M12 D-coded screw-in connector, male 4-pin, IP68-rated
- M12A-5P-IP68:
  Field-installable M12 A-coded screw-in connector, female 5-pin, IP68-rated
- CAP-M12F-MIP67-PAK04:
  Caps for M12 D-coded 4-pin male connectors, metal and IP67-rated; 4 pieces in one pack

TN-5524-8PoE Panel Layouts

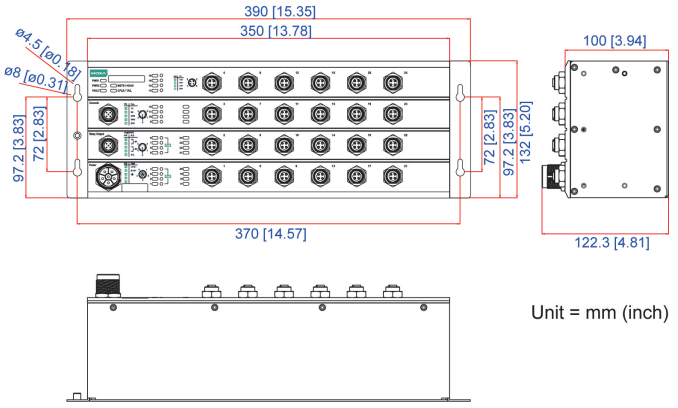






1. Screw holes for panel mounting kit
2. Console port
3. Grounding screw
4. Relay output port
5. Power input voltage range indication
6. Power input port (male 6-pin shielded M23 connector)
7. PWR1 LED: for power input 1
8. PWR2 LED: for power input 2
9. FAULT LED
10. MSTR/HEAD LED: for ring master or chain head
11. CPLR/TAIL LED: for ring coupler or chain tail
12. TP port's 10/100 Mbps LED
13. 10/100BaseT(X) port (female 4-pin shielded M12 connector with D coding)
14. 10/100BaseT(X) PoE port (female 4-pin shielded M12 connector with D coding)
15. LED for PoE port

Mounting Dimensions

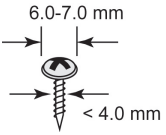


Unit = mm (inch)

Panel/Wall Mounting

STEP 1:
Mounting the TN-5524-8PoE switches to a wall requires 4 screws. Use the ToughNet switch as a guide to mark the correct positions of the 4 screws.

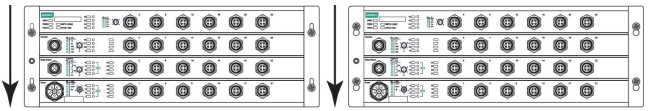
STEP 2:
Use the 4 screws in the panel mounting kit. If you would like to use your own screws, make sure the screw head is **between 6.0 mm and 7.0 mm** in diameter and the shaft is less than **4.0 mm** in diameter, as shown at the right.



Do not screw the screws in all the way—leave a space of about 2 mm to allow room for sliding the ToughNet switch between the wall and the screws.

NOTE Before tightening the screws into the wall, make sure the screw head and shaft size are suitable by inserting the screw through one of the keyhole-shaped apertures of the ToughNet switch.

STEP 3:
Once the screws are fixed in the wall, hang the ToughNet switch on the 4 screws through the large opening of the keyhole-shaped apertures, and then slide the switch downwards. Tighten the four screws for added stability.



NOTE To provide greater protection from vibrations and shocks, use screws with shaft diameter between 6.0 mm and 7.0 mm, and fix the ToughNet switch onto the wall directly through the large opening of the keyhole-shaped apertures.

Wiring Requirements

WARNING

Turn the power off before disconnecting modules or wires. The correct power supply voltage is listed on the product label. Check the voltage of your power source to make sure you are using the correct voltage. Do NOT use a voltage greater than what is specified on the product label.

These devices must be supplied by a SELV source as defined in the Low Voltage Directive 2006/95/EC and 2004/108/EC.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa switch.

This device has UL508 approval. Use copper conductors only, 60/75°C, and tighten to 4.5 pound-inches. For use in pollution degree 2 environments.

ATTENTION

Safety First!

Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Be sure to read the following guidelines:

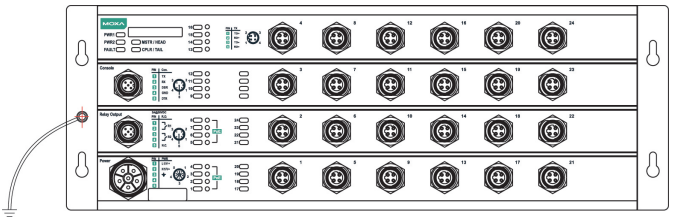
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

NOTE Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- We strongly advise that you label wiring for all devices in the system.

Grounding the ToughNet Switch

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the grounding screw to the grounding surface prior to connecting devices.



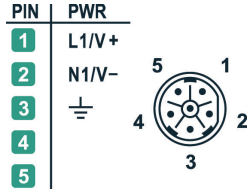
ATTENTION

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

Connecting the Power Supplies

The ToughNet TN-5524-8PoE series switches support one power supply. The M23 6-pin male connector on the TN-5524-8PoEfront panel is used for the power input.

Pinouts for the power input port on the TN-5524-8PoE



Pinouts for the power input port on the TN-5524-8PoE

Pin	Description	Usage
1	PWR1 Live / DC +	Connect "PWR1 Live / DC +" to the Live terminal when using an AC power source or to the positive (+) terminal when using a DC power source.
2	PWR1 Neutral / DC -	Connect "PWR1 Neutral / DC –" to the Neutral terminal when using an AC power source or to the negative (-) terminal when using a DC power source.
3	Chassis Ground	Connect the "Chassis Ground" to the safety ground terminal for AC inputs or to the equipment ground bus for DC inputs.

STEP 1:

Plug your power cord connector to the power input port of the TN-5524-8PoE switch.

STEP 2:

Screw the nut on your power cord connector to the power input connector on the switch to ensure a tight connection.

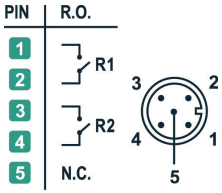
ATTENTION

Before connecting the TN-5524-8PoEto the power input, make sure the power source voltage is stable.

Connecting the Relay Outputs

Each TN-5524-8PoE switch has two sets of relay outputs—relay output 1 and relay output 2.The M12 A-coded 5-pin male connector on the TN-5524-8PoE's front panel is used for the two relay outputs. Use a power cord with an M12 A-coded 5-pin female connector to connect the relay contacts. You can purchase an M12 power cable from Moxa; the model number is CBL-M12 (FF5P)/OPEN-100 IP67.

Pinouts for the relay output port on TN-5524-8PoE



N.C.: Not Connected

FAULT:
The two sets of relay contacts of the M12 A-coded 5-pin male connector are used to detect user-configured events. The two wires attached to the fault contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains closed.

Connecting the Data Lines

10/100BaseT(X) Ethernet Port Connection

All TN-5524-8PoE models have 24 10/100BaseT(X) Ethernet ports (4-pin shielded M12 connector with D coding). The 10/100TX ports located on the TN-5524-8PoEfront panel are used to connect to Ethernet-enabled devices. Most users configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch-type) connected to the port.

In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

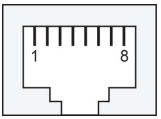
Pinouts for the 10/100BaseT(X) Ports on the TN-5524-8PoE

PIN	TX
1	TD+
2	RD+
3	TD–
4	RD–

Housing: Shield

Pinouts for the RJ45 (8-pin) Port

8-pin RJ45



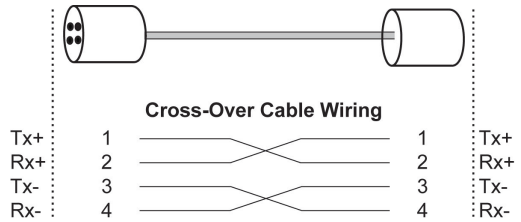
MDI Port Pinouts

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

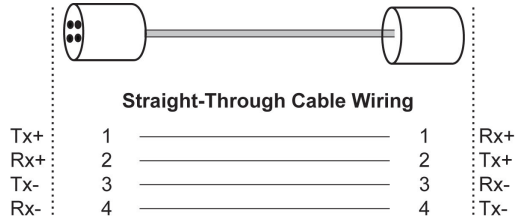
MDI-X Port Pinouts

Pin	Signal
1	Rx+
2	Rx-
3	Tx+
6	Tx-

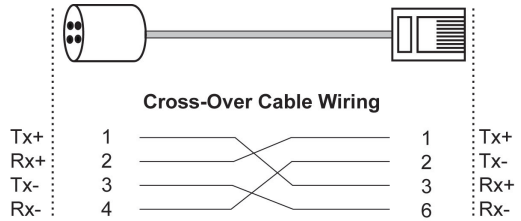
M12 (4-pin, M) to M12 (4-pin, M) Cross-Over Cable Wiring



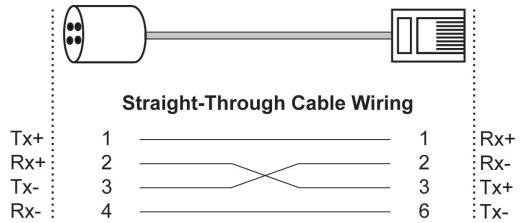
M12 (4-pin, M) to M12 (4-pin, M) Straight-Trough Cable Wiring



M12 (4-pin, M) to RJ45 (8-pin) Cross-Over Cable Wiring



M12 (4-pin, M) to RJ45 (8-pin) Straight-Trough Cable Wiring



LED Indicators

Several LED indicators are located on the ToughNet switch's front panel. The function of each LED is described in the table below.

LED	Color	State	Description
System LEDs			
PWR1	AMBER	ON	Power is being supplied to power input PWR1.
		OFF	Power is not being supplied to power input PWR1
PWR2	AMBER	ON	Power is being supplied to power input PWR2.
		OFF	Power is not being supplied to power input PWR2.
FAULT	RED	ON	When the corresponding PORT alarm is enabled, and a user-configured event is triggered.
		OFF	When the corresponding PORT alarm is enabled and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled.
MSTR/ HEAD	GREEN	ON	When the TN switch is either the Master of this Turbo Ring, or the Head of this Turbo Chain.
		Blinking	When the TN switch is Ring Master of this Turbo Ring and the Turbo Ring is broken, or it is Chain Head of this Turbo Chain and the Turbo Chain is broken.
		OFF	When the TN switch is neither the Master of this Turbo Ring, nor the Head of this Turbo Chain.
CPLR/ TAIL	GREEN	ON	When the TN switch enables the coupling function to form a back-up path in this Turbo Ring, or it is the Tail of this Turbo Chain.
		Blinking	When the Turbo Chain is down.
		OFF	When the TN switch disables the coupling function of Turbo Ring, or it is not the Tail of the Turbo Chain.

LED	Color	State	Description
Ports LEDs			
TP (10/100M)	AMBER	ON	TP port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		Off	TP port's 10 Mbps link is inactive.
	GREEN	On	TP port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		off	TP port's 100 Mbps link is inactive.
PoE	AMBER	On	Power is being supplied to a Powered Device (PD)
		Off	Power is not being supplied to a Powered Device (PD)

Specifications

Technology	
Standards	IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseT(X) IEEE 802.af PoE IEEE 802.3x for Flow Control IEEE 802.1D for Spanning Tree Protocol IEEE 802.1w for Rapid STP IEEE 802.1Q for VLAN Tagging IEEE 802.1p for Class of Service IEEE 802.1X for Authentication IEEE 802.3ad for Port Trunk with LACP
Protocols	IGMP v1/v2 device, GMRP, GVRP, SNMP v1/v2C/v3, DHCP Server/Client, DHCP Option 66/67/82, BootP, TFTP, SNTP, SMTP, RARP, RMON, HTTP, HTTPS, Telent, SSH, Syslog, LLDP, IEEE 1588 PTP, Modbus/TCP, IPv6
MIB	MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1, 2, 3, 9
Flow Control	IEEE802.3x flow control, back pressure flow control
Switch Properties	
Priority Queues	4
Max. Number of Available VLANs	64
VLAN ID Range	VID 1 to 4094
IGMP Groups	256
Interface	
Fast Ethernet	Front cabling, M12 connector, 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
Console Port	M12 A-coding 5-pin male connector
System LED Indicators	PWR1, PWR2, FAULT, MSTR/HEAD, CPLR/TAIL
Port LED Indicators	10/100M (Fast Ethernet port)
Alarm Contact	Two relay outputs in one M12 A-coding 5-pin male connector with current carrying capacity of 3 A @ 30 VDC

Power Requirements	
Input Voltage	24 VDC (16.8 to 30 VDC)
Input Current	Max. 8.4 A @ 24 VDC
Connection	M23 6-pin male connector
Overload Current Protection	Present
Reverse Polarity Protection	Present
Physical Characteristics	
Housing	Metal, IP40 protection (with protective caps on unused ports)
Dimensions (W × H × D)	390 x 132 x 122.3 mm (15.35 x 5.20 x 4.81 in)
Weight	TN-5524-8PoE Series: 5330 g
Installation	Panel mounting
Environmental Limits	
Operating Temperature	Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Operating Humidity	5 to 95% (non-condensing)
Regulatory Approvals	
Safety	UL508
Rail Traffic	EN50155, EN50121-3-2, EN50121-4
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 (ESD), level 3 EN61000-4-3 (RS), exceeds level 3 EN61000-4-4 (EFT), level 3 EN61000-4-5 (Surge), level 3 EN61000-4-6 (CS), level 3 EN61000-4-8
Shock	IEC61373
Freefall	IEC60068-2-32
Vibration	IEC61373
Note: Please check Moxa's website for the most up-to-date certification status.	
WARRANTY	
Time Period	5 years
Details	See www.moxa.com/warranty

Technical Support Contact Information
www.moxa.com/support

Moxa Americas:
Toll-free: 1-888-669-2872
Tel: 1-714-528-6777
Fax: 1-714-528-6778

Moxa China (Shanghai office):
Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505

Moxa Europe:
Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa Asia-Pacific:
Tel: +886-2-8919-1230
Fax: +886-2-8919-1231